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Pesticide Fact Sheet Number 145: Fenvalerate

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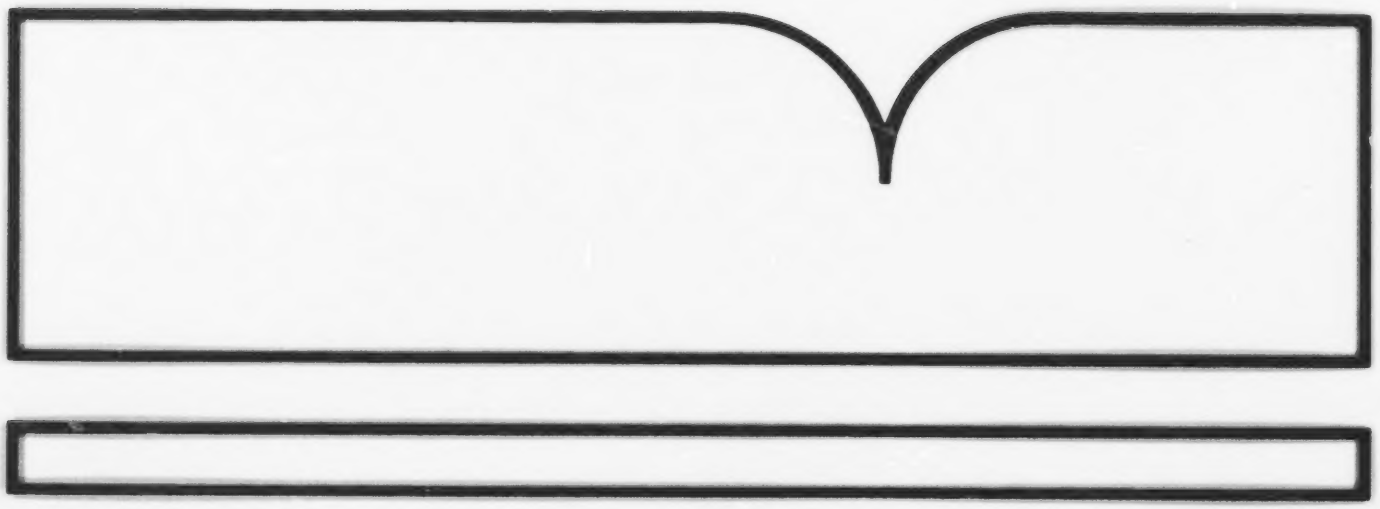

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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, science findings.

b. Identifiers/Open-Ended Terms

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Office of Pesticide Programs (TS-766C)
Washington, DC 20460

EPA Pesticide Fact Sheet

Name of Chemical: FENVALERATE
Reason for Issuance: Registration update
Date Issued: September 11, 1987
Fact Sheet Number: 145

1. DESCRIPTION OF CHEMICAL

Generic Name: (S)-cyano (3-phenoxyphenyl) Methyl-(s)-4-chloro-alpha-(1-methylethyl) benzeneacetate

Common Name: Fenvalerate (BSI, ISO)

Trade Names: Pydrin; Sumicidin; Belmark

Other Names: S-5602; Sanmarton; SD 43775; Sumifly; Sumipower

EPA Shaughnessy Code: 109301

Chemical Abstracts Service (CAS) Number: 51630-58-1

Year of Initial Registration: 1978

Pesticide Type: Pyrethroid-like; Insecticide/miticide

Chemical Family: Pyrethroid

Manufacturers: E. I. Dupont de Nemours; Sumitomo Chemical Co, Ltd (Japan)

2. USE PATTERNS AND FORMULATIONS

Application Sites: Foliar treatments for control of various insect pests on agricultural crops, fruits, vegetables, ornamentals, lawns. Space and contact spray treatments in and around commercial and residential areas such as hospitals, supermarkets, motels, hotels, homes, transportation equipment (buses, boats, ships, trains, airplanes), utilities, food processing plants, restaurants and other food handling establishments, for control of common premise pests such as cockroaches, crickets, and ticks. Direct spray treatments for control of ectoparasites on pets, horses; cattle eartag; and spot treatment of fire ant mounds, and soil treatment for subterranean termite control in and around buildings and structures.

Types of Formulations: Emulsifiable concentrates; liquids (ready-to-use), ready-to-use, and impregnated, and ULV concentrate.

3. Chemical/Physical Characteristics of the Technical Grade

Physical State: Liquid.

Color: Clear viscous yellow

Odor: Mild chemical odor

Molecular weight and formula: 419.9 - $C_{25}H_{22}ClNO_3$.

Melting Point:

Boiling Point:

Density: 1.17 g/ml at 23° C.

Vapor Pressure: 1.1×10^8 mmHg at 25°C.

Solubility in various solvents: In H_2O, <1 mg/l at 20° C.
In acetone, chloroform, cyclohexane, ethanol, and xylene, >1 kg/kg at 23° C.
In hexane, 155 g/kg at 23° C.

Stability: Stable to heat and sunlight; stable to moisture; more stable in acid (pH 4) than alkaline solution.

Toxicology Characteristics of the Technical Grade

- Acute Oral: LD_{50} 1-3 gms/kg for rat.
- Acute Dermal LD_{50} for rabbit = 1-3 gms/kg
- Primary Dermal Irritation (rabbit): none observed
- Primary Eye Irritation (rabbit): none observed
- Skin Sensitization (guinea pig): none observed
- Acute Inhalation(rat); LC_{50} > 101 gms/m_3/4 hours
- Subchronic oral: rat - NOEL = 125 ppm;

  dog - NOEL = 500 ppm (HDT)
- Chronic Toxicity (rat): NOEL =250 ppm (HDT)

Toxicology Characteristics of the Technical Grade (continued)

- Chronic Toxicity (dog)*: NOEL = 200 ppm (HDT)
- Oncogenicity (24 month - mice): systemic NOEL = 10-50ppm, no oncogenic effects at 1,250ppm (HDT)
- Teratogenicity: Teratogenic (mice) NOEL = 50 mg/kg/day (HDT); Teratogenic (rabbit) NOEL = 50 mg/kg/day (HDT)
- Reproduction (3-Gen. Rat): NOEL = 250 ppm (HDT)
- Mutagenicity (dominant lethal - mice): negative at 100 mg/kg, (HDT)
- Host medicated - (Mice): Negative at 50 mg/kg (HDT)
- Mutagenic - (Ames); Negative
- Mutagenic - (Chinese hamster, bone marrow): Negative at 25 mg/kg

*MO 70616 containing 75% of the active isomer (A-alpha) was tested in place of SD 43775 which contains 18% of its A-alpha isomer.

Physiological and Biochemical Characteristics

- The mode of action in biological systems is stomach and contact, exhibiting neuropathological characteristics typical of pyrethroid insecticides. Slight repellant effect.
- Foliar absorption: N/A
- Translocation: N/A

Environmental Characteristics

Adequate data are sufficient to define the fate of fenvalerate in the environment. Fenvalerate is stable to hydrolysis at environmental pH and temperature and to photolysis. In aqueous solutions exposed to

Environmental Characteristics (continued)

natural sunlight, approximately 52% of the parent compound degraded with a calculated half-life of 41 days. In the laboratory, in soil maintained under aerobic conditions the half-life ranged from 65 days to 8 months, in soil maintained under anaerobic conditions the half life was approximately 6 months. In column-leaching studies where fenvalerate was applied to different soil types and then saturated with water, results indicated that fenvalerate and aged degradation products were relatively immobile. Field studies indicate that residues of fenvalerate remain in the 0-4 inch layer with a half-life of 1-2 months. After 183 days, residues were at negligible or undetectable levels. Confined and field rotational crop data show that residues of fenvalerate are likely to occur in root crops at intervals of less than nine months. Bioaccumulation factors of 400X were found in edible portions of rainbow trout after exposure for 30 days. Depuration was relatively slow with about 40-60% of the residual activity remaining after 33 days and virtually all as intact parent compound. In catfish, with a bioaccumulation factor of 62X the depuration was also slow with a half-life of 46 days in whole fish.

Ecological Effects Characteristics

- Avian acute oral LD_{50} (Mallard): LD_{50} = 9,932 mg/kg.
- Avian dietary LC_{50} (Bobwhite quail): LC_{50} > 10,000 ppm.
- Avian dietary LC_{50} (Mallard): LC_{50} = 5,500 ppm.
- Fish acute 96-hour LC_{50} (Bluegill sunfish): LC_{50} = 0.42 ppb.
- Aquatic invertebrate acute 48-hour LC_{50} (Pink shrimp)*: (96-hour) EC_{50} = 1.4 ppb.

Tolerance Assessments

The maximum premissible intake (MPI) was calculated using the rat no-observable effect level (NOEL) of 50 ppm, which was determined in a subchronic (13-week) feeding study. The study was conducted with MO 70616 which containing 75% of the active isomer (A-alpha) instead of the SD 43775 which contains 18% of its A-alpha isomer. This NOEL is equivalent to 2.5 mg/kg/day. A safety factor of 100 results in a calculated acceptable daily intake (ADI) of 0.025 mg/kg/day and an MPI of 1.5 mg/kg/day for a 60 kg human.

No additional data are required to support the current crop tolerances listed in 40 CFR 8180.379

Summary Science Statement

- Fenvalerate, a synthetic pyrethroid is toxic to wildlife and extremely toxic to fish. It is higly toxic to bees exposed to direct treatment on blooming crops or weeds. Fenvalerate has low toxicity to mammals. A 24-month feeding/oncogenic (rat) study demonstrated that fenvalerate is not oncogenic. Mutagenicity data indicate that fenvalerate was negative for all mutagenic tests conducted. Fenvalerate is immobilized in soils. The aged degradation products of fenvalerate do not leach significantly in a sandy loam soil column. It degrades in the soil under field conditions. At this time, there are no concerns for ground-water contamination.

4. Summary of Major Data Gaps

- Freshwater invertebrate life-cycle test
- Estuarine invertebrate life-cycle test
- Simulated and/or actual field study

5. Summary of Tolerances Issued for Fenvalerate

Commodity	Parts per million
Almond hulls	15.0
Almonds	0.2
Apples	2.0
Artichokes	0.2
Beans, dried	0.25
Beans, snap	2.0
Broccoli	2.0
Cabbage	10.0
Cantaloupes	1.0
Carrots	0.5
Cattle, fat	1.5
Cattle, mbyp	1.5
Cattle, meat	1.5
Cauliflower	0.5
Collards	10.0
Corn, grain	0.002
Corn, fodder	50.0
Corn, forage	50.0
Corn, sweet, kernels & cobs	0.1
Cottonseed	0.2
Cucumbers	0.5
Eggplant	1.0
English walnuts	0.2
Filberts	0.2
Goats, fat	1.5
Goats, mbyp	1.5
Goats, meat	1.5
Hogs, fat	1.5
Hogs, mbyp	1.5
Hogs, meat	1.5
Honeydew melons	1.0
Horses, fat	1.5
Horses, mbyp	1.5
Horses, meat	1.5
Milk	0.3
Milk, fat	7.0
Muskmelons	1.0
Peanuts	0.002
Peanut hulls	0.10
Pears	2.0
Peas	1.0
Peas, dried	0.25
Pecans	0.2
Peppers	1.0

5. Summary of Tolerances Issued for Fenvalerate (continued)

Commodity	Parts per million
Potatoes	0.02
Pumpkins	1.0
Radish, roots	0.3
Radish, tops	8.0
Sheep, fat	1.5
Sheep, mbyp	1.5
Sheep, meat	1.5
Soybeans	0.05
Stone fruits	10.0
Sugarcane	2.0
Summer squash	0.5
Sunflower seed	1.0
Tomatoes	1.0
Watermelons	1.0
Winter squash	1.0

6. Contact Person at EPA

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